Query Air Data (QAD) User's Guide

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1. Query Air Data Users Guide

This manual describes how to use the Query Air Data (QAD) interface to retrieve data from the AQS Data Mart.

1.1. User Registration

User registration is required. These are the steps to register for a Query Air Data user ID and password

Before you begin

Have an email address to use as your user ID.

Procedure

1.   **Note**

    Your user ID will be your email address. All communications from the QAD application will be sent to this address.

    Send an email to **aqsdatamart@epa.gov** requesting a QAD User ID.

    You will receive an email back verifying your email address and providing your password. Please allow three business days for a response.

    Your password is automatically generated, if for any reason the password does not work for you please reply and ask for a new password.

What to do next

Guidelines for Use and Availability

We ask the you abide by the following. You will have no more than three (3) queries active simultaneously. A synchronous query is active until the data file has been returned and downloaded to you local machine. An asynchronous query is active until you receive an email that the query is complete. A retrieve request counts as an active query and is not complete until the data file has been returned and downloaded to you local machine.

EPA may disable any account at any time for any reason and may change these guidelines. The system is generally unavailable from 2-3am eastern time each weekday for maintenance.

1.2. Select Method of Query

You can query the database either by using a GUI or by building and submitting a URL get request.

About this task

There are two methods of getting data from the QAD application - you can use a graphical user interface (GUI) or you can use a RESTful web service by constructing a valid URL request and submitting that.

Procedure

1. Choose to use the URL request or the GUI.

   Note, the GUI will return a valid RESTful URL request string in the browser URL window if you make an asynchronous (rawDataNotify) request. So, if you want a working example of a URL to build on, you can begin by using the GUI.

1.3. Constructing a query using the graphical interface

An overview of how to construct a query using the graphical user interface (GUI).

About this task

This section provides an overview of how to construct a GUI request.

Procedure

1. Navigate to the web page with the GUI.

   Go to this web page:

   https://ofmext.epa.gov/AQDMRS/aqdmrs.html

   You should see a page like this

2. Enter the query parameters using the pull-downs or typing.

Field	Instructions	Required?
User Name	Your user name	Required
Password	Your password	
Query Type	Select **rawData** to run an interactive (synchronous) query where you will wait for the results to be returned to your browser. Select **rawDataNotify** to submit a query (asynchronous) that will send you an email when complete.	Required

Field	Instructions	Required?
	(The request ID for process tracking is returned immediately). Note, both queries have limits on the amount of data that can be returned, rawDataNotify has larger limits. Also, rawDataNotify will display the URL that was used to build the query, which you can edit and use again, bypassing the GUI.	
Output Format	The format of the file returned by the query. The possible values are DMCSV , AQCSV, and AQS. (Descriptions of the files are later in this document.)	Optional. Will default to DMCSV if not provided.
Parameter Class	The classification (group) of parameters to select (e.g., Criteria, HAP, meteorological). Note, selecting an entry here will return all members of the class. It will also shorten the list below (*parameter code*) to just those in the class for easier selection.	One of these must be selected.
Parameter Code	The AQS parameter code of the measurements you would like.	
Begin Date	The beginning date of the measurements you would like.	Required
End Date	The ending date of the measurements you would like.	Required
Min Latitude Max Latitude Min Longitude Max Longitude	The bounding box of the area you would like data from. Use decimal values, west and south are negative.	A geography selection is required. It can be: bounding box, state, state + county, state + county + site, cbsa, or csa
State Code	The FIPS state code of the measurements you would like. Selecting a state will enable you to select a county within the state in the next box.	
County Code	The FIPS county code of the measurements you would like. Selecting a county will enable you to select a site within the county in the next box.	
Site	The unique site of the measurements you would like.	
CBSA	The core based statistical area of the measurements you would like.	
CSA	The consolidated statistical area of the measurements you would like.	

Field	Instructions	Required?
Duration	The sample duration (e.g., hourly or daily) of the measurements you would like. Note, this query by default returns samples and sub-daily averages, so if you only want hourly samples, select 1-Hour.	Optional, returns all sample durations and sub-daily averages by default.
FRM Only	Check if you would like only federal reference method (FRM) and federal equivalent method (FEM) data.	Optional

3. Click the **submit** button.

Results

You will get a file of data or a request ID (and, later, an email), depending on the type of query requested. Note, if running a synchronous query, the file may take several minutes to return. Any data you request from a synchronous service (rawData) will be returned to you as a text (.txt) file. Any data you request from an asynchronous service (rawDataNotify) will be returned to you as a zipped file (.tgz extension). Any list or status requests will be returned as plain text.

If there is a problem with what you have selected (missing or invalid value, query exceeds limits, etc.) then you will get an error message describing the problem. Note, returning to the GUI using the **back** button will return you to an unpopulated form (usually); the application cannot recall your request parameters.

Result files are **not sorted** in any way.

1.4. Constructing a URL Request - Quick Start Guide

This section gives a quick start on how to query data using just a URL.

Procedure

1. Sample query.

   IF you follow this link:

   https://ofmext.epa.gov/AQDMRS/ws/rawData?
   user=*&pw=**&format=DMCSV&param=44201&bdate=20110501&edate=20110501&state=37&county=063&site=0015&

   You will get an 'invalid credentials' message. Replace the * with your user ID and the ** with your password and request the URL. After a few moments you should get a dialog box asking if you'd like to open or save the returned file.

   The file will look something like this:

   ```
   36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","23:00","2
   36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","22:00","2
   36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","21:00","2
   ...
   ```

   This is a data file in the requested format. To explain what the URL did, here's a breakdown of what it contains.

URL Part	Function
https://ofmext.epa.gov/AQDMRS/ws/	Please access the EPA server with Air Quality quries
rawData	Run a query that will return raw data to my browser

URL Part	Function
user	Your user ID
pw	Your password
format=DMCSV	In the AQS Data Mart Comma Separated Values format
param=44201	For Parameter Code 44201 (ozone)
bdate=20110501	For times beginning on May 01, 2011
edate=20110501	And times ending on May 01, 2011 (e.g., for 1 day)
state=37	For FIPS State Code = 37 (North Carolina)
county=063	For FIPS County Code = 063 within North Carolina (Durham)
site=0015	For Site Number 0015 within Durham County
dur=1	For data with duration = 1 (hourly data)
frmonly=y	And only data collected with Federal Reference or Equivalent Methods (FRM Only = yes)

You can adjust these parameters and try running the query again (be sure to keep the URL format with the ? separating the query from the variable list and the & between each variable). For example, you can delete the *site* variable and get data for all sites in the county. You can change the state and county codes to get a different county. You can change the date ranges (in YYYYMMDD format).

NOTE There are query size limits and varible combination restrictions that if not followed will result in you getting an error message instead of data. For details read the complete documentation (there are additional variables available; other queries you can run; and you can have the results emailed to you instead of waiting on-line). This is intended as a quick start to show how the system works.

There is also a Graphical User Interface (GUI) that will guide you through constructing a query if you'd rather do it that way.

1.5. Constructing a URL Request - Overview

An overview of how to construct a URL query request that will execute when submitted.

About this task

This section provides an overview of how to construct a URL request and describes the three main components of the URL request: the endpoint, the service, and the selection variables. More details about how to construct each of the services is provided later in the document.

Procedure

1. Select the service to use based on the data you need.

   Currently the QAD application offers 5 services. Two to get raw data, one to download results, and two to find out information about the system.

   Below is a summary of each of the services. After that, the differences between synchronous and asynchronous usage is explained. *The details of constructing a request from each service are explained in detail (including examples) in their own sections of this documentation.*

   Services Available

Service	Description
rawData	The synchronous (returns data while you wait) service to get raw data. By 'synchronous' we mean that the data is returned to you in an interactive

Service	Description
	session - you have to wait for it. The advantage of this service is it is interactive. The disadvantage is that the query size allowed is very limited and the response times can be slow for an interactive session (even data for 1 monitor can take 30 seconds or more). We strongly encourage the use of the asynchronous service rawDataNotify over the use of this one.
rawDataNotify	The asynchronous (emails you when done) service to get raw data.
retrieve	Download results from a previously requested (*Notify*) query.
list	Get a list of valid values for selection variables needed in constructing other queries.
serviceAvailable	To determine if the web server is responding to requests.

2. Construct the URL request.

    To run a QAD query with a URL, it first must be constructed. It contains three main parts: the endpoint, the service, and the selection variables. It is formatted: *endpoint*/*service*?*variable_selections*.

    The `endpoint` is the host machine that will provide the service.

    For the QAD application, the endpoint is always `https://ofmext.epa.gov/AQDMRS/ws`.

    Note, this is always followed by a slash (/) character.

    The `service` is the name of the query to run (from the table above). The selection of service will determine both what kind of data you get back and how it is delivered to you.

    Note, the service is always followed by a question mark (?) character.

    The `variable_selections` provide filters for your results; you must choose a particular parameter, time frame, geography, and other selections.

    The variable selections consist of a variable and the desired value separated by an equals sign (=). For example, `state=01`.

    There can be as many variable selections as you like and each one is separated by an ampersand (&) character. For example, `state=01&county=001`.

    Here is an example using placeholders which illustrates the construction of a request.

    `https://ofmext.epa.gov/AQDMRS/ws/`**`request`**`?`**`variable1`**`=value1&`**`variable2`**`=value2`

    Note: this is not valid example and will not work. See the "examples" section under each query type to see working examples.

3. Submit the URL.

    The next step is to submit the URL you have constructed

    This can be done by using a browser: paste the text into the URL line and request it; or by using a `wget` type command.

4. Retrieve the results.

    The final step is to get the data you have requested. Any data you request from a synchronous service (rawData) will be returned to you as a text (.txt) file. Any data you request from an asynchronous service (rawDataNotify) will be returned to you as a zipped file (.tgz extension). Any list or status requests will be returned as plain text.

- If you run a synchronous query the results will be returned to the browser (or other device) you used to execute the query as soon as the query is complete.

  Note: Different browsers will behave differently. Some may display the text in the HTML display window, but most will prompt the user with a file-save dialog because we encode the returned data as a 'file' type rather than as a text string. This application has been tested in various versions of Firefox, Chrome, Safari, and Internet Explorer.

- If you run an asynchronous (notify) query the system will immediately give you a `request ID`. You can use this number to track the progress of your request and later download the results of your query.

  The easiest thing to do is to wait for an email to be sent to you (to the email address used as the user ID). This email will contain a link to the results file.

Related information

- Section 1.6. Constructing a URL Request - Raw Data
- Section 1.7. Constructing a URL Request - Retrieve
- Section 1.8. Constructing a URL Request - List
- Section 3.1. Query Limits

1.6. Constructing a URL Request - Raw Data

This provides an exhaustive description of how to construct a URL raw data query request.

Procedure

1. Construct a valid URL.

   The first step to running a QAD query with a URL is constructing a valid request string containing all the required elements. It contains three main parts: the endpoint, the service, and the selection variables. It is formatted: *endpoint*/*service*?*variable_selections*.

   a. Start with the endpoint.

   The first part of the URL is the *endpoint* (host machine that will provide the service) and for the QAD application, the endpoint is always `https://ofmext.epa.gov/AQDMRS/ws`.

   Note, this is always followed by a slash (/) character.

   b. Add the service.

   The second is the *service* that you would like to request. The selection of service will determine both what kind of data you get back and how it is delivered to you.

   Currently in QAD, there are four services available.

Service	Description
rawData	The synchronous (returns data to your screen) service to get raw data.
rawDataNotify	The asynchronous (emails you when done) service to get raw data.*

   *Please see the overview section for details on the benefits of submitting asynchronous queries. Use of the `rawDataNotify` query is strongly recommended over the `rawData` service for these reasons.

   Note that the service names are in camelCase.

   Note that the service name is always followed by a question mark (?) character.

   c. Add the variable selections to filter the returned data.

The *variable_selections* are how you provide filters for your results; choosing a particular parameter, time frame, geography, and other selections

The variable selections consist of a variable and the desired value separate by an equals sign (=). For example, state=01.

There can be as many variable selections as you like and each one is separated by an ampersand (&) character. For example, state=01&county=001.

If you are selecting a raw data query (rawDataNotify or rawData), the table below shows a valid list of selection variables. To get a list of valid values for the 'codes' in the table below, see the list service description.

Raw Data Selection Variables

Variable	Represents	Example	Required?
user	user name	qaduser	Required
pw	password	fakepass	Required
format	output format	DMCSV	Required - defaults to DMCSV if not provided
pc	parameter class	CRITERIA	Optional
param	parameter code	88101	Required if *pc* variable not provided
bdate	begin date of data YYYY(MM(DD))[1]	20120131	Required
edate	end date of data YYYY(MM(DD))[2]	20120301	Required
cbdate	change begin date of data YYYY(MM(DD)).[3] The usage of cbdate and cedate is as follows: bdate and edate define the dates on which the samples were taken and cbdate and cedate represent the dates the values were last changed at EPA. So the example dates given would provide data for January 31, 2012 through March 01, 2012 that was submitted to EPA (or changed) between March 31, 2012 and March 25, 2012.	20120314	Optional

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[1] The full date can be provided in YYYMMDD format, as in 20120131. If the day is left off as in 201201, the first day of the month will be used. If the month is also left off as in 2012, the first day of the year will be used.

[2] The full date can be provided in YYYMMDD format, as in 20120131. If the day is left off as in 201201, the last day of the month will be used. If the month is also left off as in 2012, the last day of the year will be used.

[3] The abbreviated date format is also allowed here.

Variable	Represents	Example	Required?
cedate	change end date of data YYYY(MM(DD))[4]	20120325	Optional
state	state fips code (leading zeros required)	01	Required if *bounding box* not provided
county	county fips code (leading zeros required)	001	Optional
site	site number (leading zeros required)	1001	Optional
cbsa	core based statistical area code (leading zeros required)	26620	Optional
csa	consolidated statistical area code (leading zeros required)	290	Optional
minlat	minimum latitude of bounding box	34.66	Optional
maxlat	maximum latitude of bounding box	34.7	Optional
minlon	minimum longitude of bounding box	-86.6166	Optional
maxlon	maximum longitude of bounding box	-86.55	Optional
dur	sampling duration code	1	Optional, will return all samples and sub-daily averages if not specified.
frmonly	include FRM/FEM data only. Y will return only FRM/FEM data. N will return data that is not FRM/FEM. Leaving this option off will return all data.	y	Optional

2. Submit the URL.

   The second step is to submit the URL you have constructed

   This can be done using a browser - the request can be pasted into the URL line and requested - or using a wget type command.

3. Retrieve the results.

   The final step is to get the data you have requested.

   • If you run a synchronous query the results will be returned to the browser (or other device) you used to execute the query as soon as the query is complete.

   Note: Different browsers will behave differently. Some may display the text in the HTML display window, but most will prompt the user with a file-save dialog since we encode the returned data as a 'file' type rather than as a text string.

---

(4) The abbreviated date format is also allowed here.

- If you run an asynchronous (notify) query the system will immediately give you a `request ID`. You can use this number to track the progress of your request and later download the results of your query.

  The easiest thing to do is to wait for an email to be sent to you (to the email address used as the user ID). This email will contain a link to the results file.

  The other method is to use the `retrieve` service in the form: `https://ofmext.epa.gov/ AQDMRS/retrieve?id=#########`

  Where ######### is the `request ID` provided to you earlier.

Results

Note, the examples below will not work because the user DID and password are bogus. They will work if you replace * with your user ID and ** with your password.

Example 1

To select ozone data for Durham County, NC, for May 01, 2011, using a synchronous query and returning data in DMCSV format.

```
https://ofmext.epa.gov/AQDMRS/ws/rawData?
user=*&pw=**&format=DMCSV&param=44201&bdate=20110501&edate=20110501&state=37&county=063
```

The system returns a file named `AQDM_85106434.txt` with the contents:

```
36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","23:00","2011-
36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","22:00","2011-
36.032944,-78.905417,"NAD83",3.04,"37","063","0015","44201",1,"Ozone","2011-05-01","21:00","2011-
...
```

Example 2

To select ozone data for Durham County, NC, for May through September of 2011, using an asynchronous query and returning data in DMCSV format.

```
https://ofmext.epa.gov/AQDMRS/ws/rawDataNotify?
user=*&pw=**&format=DMCSV&param=44201&bdate=20110501&edate=20110930&state=37&county=063
```

The system returns: `81544316`

This is your `request ID` to be used later to retrieve the results (and it will be emailed to you when the job is complete).

Example 3

To select criteria pollutant data for site number 1001 in Durham County, NC, for all of 2010, using an asynchronous query and returning data in DMCSV format.

Note the use of the parameter class (`pc` variable) variable. Also, leaving the month and day selection off the begin and end dates selects the entire year.

```
https://ofmext.epa.gov/AQDMRS/ws/rawDataNotify?
user=*&pw=**&format=DMCSV&pc=CRITERIA&bdate=2010&edate=2010&state=37&county=063&site=1001
```

The system returns: `82294243`

Example 4

To select benzene data for the Durham CBSA for 2000 - 2010, using a synchronous query and returning data in DMCSV format.

```
https://ofmext.epa.gov/AQDMRS/ws/rawData?
user=*&pw=**&format=DMCSV&param=45201&bdate=2000&edate=2010&cbsa=20500
```

The system returns: `Request exceeds size limits.`

This is because the query size limit for an asynchronous query was surpassed. For 10 years, a single site is the largest 'geographic' selection allowed.

Related information

• Section 1.5. Constructing a URL Request - Overview
• Section 3.1. Query Limits
• Section 2.1. You get an "HTTP 400 Bad Request / The webpage cannot be found" error in Internet Explorer

1.7. Constructing a URL Request - Retrieve

A description of how to construct a URL retrieve file request.

About this task

Procedure

1. Construct a valid URL.

   The first step to running a *retrieve* query is constructing a valid request string. It contains two parts: the retrieve service request and the `request ID` for which to get the data. It is formatted: `https://ofmext.epa.gov/AQDMRS/ws/retrieve?id=########`.

   Where ####### is the `request ID`.

   When you ran an asynchronous (*Notify*) query the system returned a `request ID`. Substitute this ID for the #######

2. Submit the URL.

   The second step is to submit the URL you have constructed

   This can be simply by using a browser - the request can be pasted into the URL line and requested - or using a `wget` type command.

3. Retrieve the results.

   The final step is to get the data you have requested. The data will be returned in a compressed (.tgz) file.

Example

To retrieve the data for request ID 12345678.

`https://ofmext.epa.gov/AQDMRS/ws/retrieve?id=12345678`

The system returns a file named `AQDM_12345678.tgz`

Result files are not sorted in any way.

Related information

• Section 1.5. Constructing a URL Request - Overview

1.8. Constructing a URL Request - List

A description of how to construct a URL list query request.

About this task

Procedure

1. Construct a valid URL.

A valid *list* query is consists of the endpoint, the service, the list name, any qualifiers, and the resource. It is structured like this: `https://ofmext.epa.gov/AQDMRS/ws/list?name=NAME&QUALIFIER=VALUE&resource=rawData`.

Where `NAME` is the name of the list you would like to get. It can be any variable listed in the resource. For example, consider the rawData resource (the service that returns raw data values) the `NAME` can be any variable that you qualify your query by: state, county, parameter class (pc), parameter (param), duration, etc.

And `QUALIFIER` and `VALUE` are an optional variable pair that can restrict the values returned. For example, if you select *param* as the name, the `QUALIFIER` can be *pc* (parameter code) and the `VALUE` can be *CRITERIA*. This will return only the parameters in the parameter class of "CRITERIA".

Valid values for List query for rawData and rawDataNotify resources

List Name	Allowed Qualifiers
state	
county	state
site	state, county
pc	
param	pc
format	
cbsa	
csa	
duration	

2. Submit the URL.

   The second step is to submit the URL you have constructed

   This can be done using a browser - the request can be pasted into the URL line and requested - or using a `wget` type command.

3. Retrieve the results.

   The final step is to get the data you have requested.

   All list queries are synchronous and the results will be returned as streaming text as soon as the query is complete. The results should be displayed in your browser (or returned to the calling process).

Results

Parameter codes

`https://ofmext.epa.gov/AQDMRS/ws/list?name=param&resource=rawData`

will return the list of all parameter codes and their meanings:

```
11101   Suspended particulate (TSP)
11102   Suspended particulate (TSP) LC
11103   Benzene soluble organics (TSP)
...
```

Criteria pollutant parameter codes

To get just the criteria pollutant parameter codes:

`https://ofmext.epa.gov/AQDMRS/ws/list?name=param&pc=CRITERIA&resource=rawData`

```
11101   Suspended particulate (TSP)
```

```
12128    Lead (TSP) STP
14129    Lead (TSP) LC
42101    Carbon monoxide
42401    Sulfur dioxide
42602    Nitrogen dioxide (NO2)
44201    Ozone
81102    PM10 Total 0-10um STP
85129    Lead PM10 LC FRM/FEM
88101    PM2.5 - Local Conditions
```

Parameter classes

To get the list of available parameter classes (pc):

`https://ofmext.epa.gov/AQDMRS/ws/list?name=pc&resource=rawData`

```
ALL    All Substances
AQI POLLUTANTS    Pollutants that have an AQI Defined
CORE_HAPS    Urban Air Toxic Pollutants
CRITERIA    Criteria Pollutants
HAPS    Hazardous Air Pollutants
...
```

Counties within a state

To get the list of the counties within state 01 (Alabama):

`https://ofmext.epa.gov/AQDMRS/ws/list?name=county&state=01&resource=rawData`

```
001    Autauga
003    Baldwin
005    Barbour
007    Bibb
...
```

Related information

• Section 1.5. Constructing a URL Request - Overview

# 2. Troubleshooting: what to do if you encounter problems

Here is a compilation of frequently encountered problems and what you can do about them.

If you do not see a resolution to your problem here, please contact **aqsdatamart@epa.gov**.

2.1. You get an "HTTP 400 Bad Request / The webpage cannot be found" error in Internet Explorer

Internet Explorer returns a "failure" screen but with little useful information.

Internet Explorer often intercepts and attempts to reinterpret messages returned by web servers. Unfortunately, it captures the detailed messages QAD sends and replaces them with its own simplified version. If you see a message like this
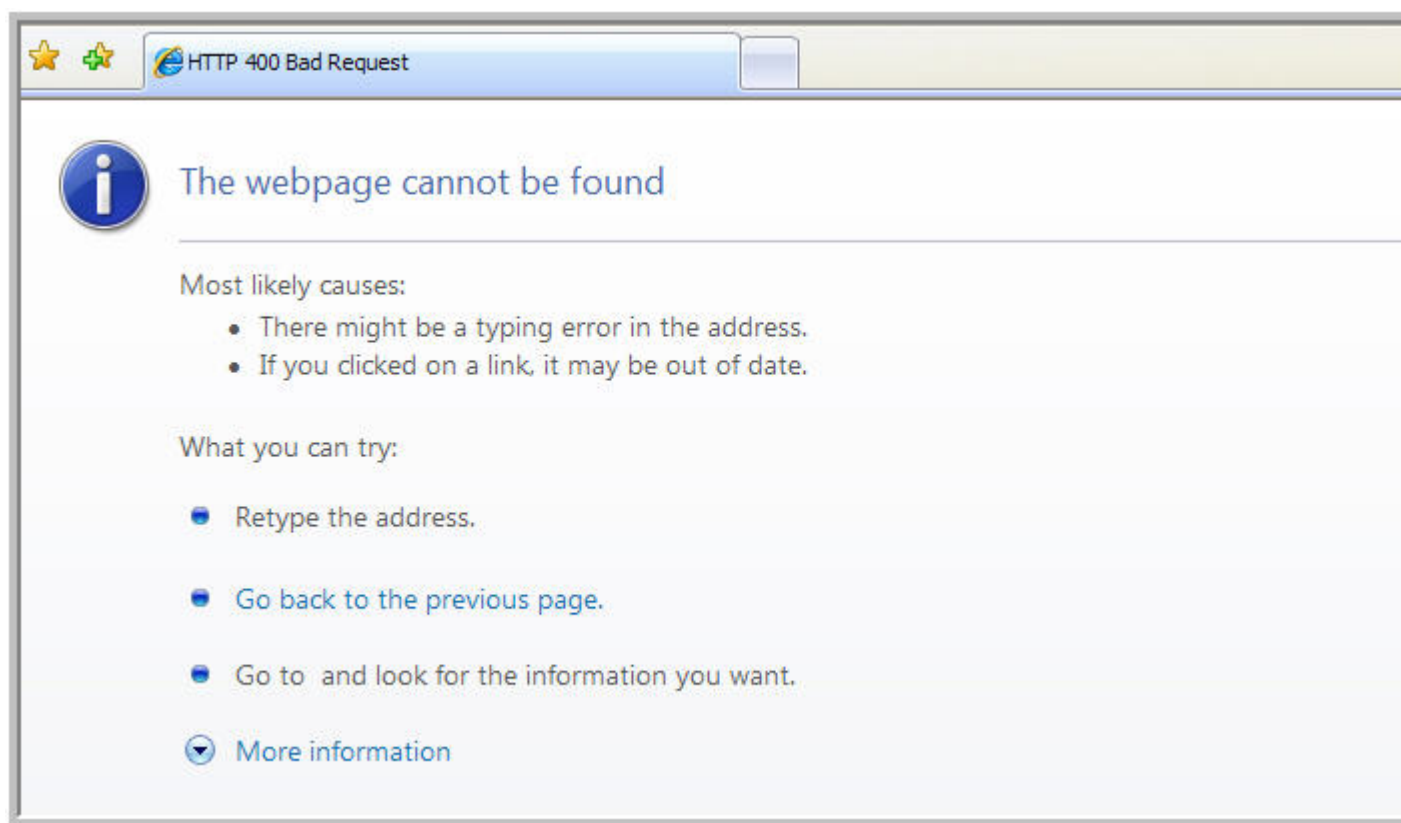
you most likely (1) exceeded the query limits, (2) did not include a required element, or (3) provided an invalid query parameter (e.g., typo).

You might be able to see the full message sent by opening the **Tools** menu, selecting **Internet Options**, selecting the **Advanced** tab and unchecking the **Show Friendly HTTP error messages** option.

Note: Other browsers might return the full QAD error message.

Related information

• Section 3.1. Query Limits
• Section 1.6. Constructing a URL Request - Raw Data

3. Reference Materials

Supplemental information to help you interpret the output of the QAD system.

3.1. Query Limits

There are restrictions on the size and number of queries that can be run.

To ensure the availability of the system to all users, we have placed a limit on number of queries that any one user can have running at the same time and also on the size of any single query.

Concurrent queries

No user may have more than 3 queries running. If you have three active queries, you will get an error message if you try to submit another one. Also, if the system is currently processing 12 queries from all users (including anonymous users), no new queries can be submitted.

Query size limits background

No single query can exceed the limits in the table below. Note that registered users are allowed to run queries significantly larger in scope than anonymous users. If the system loading and performance allows, we will relax these limits as time goes by.

The goal was to keep the number of data values returned below a certain threshold. However, since you can't actually know the number of data values until a request is made (that is, California will have more values in a day than Rhode Island), we decided to use constraints on the selection variable combinations - which you can know before you construct a query.

Query size limits as of April 24th, 2012 are listed below.

`Time span` is defined as he difference between your begin date and end date (`bdate` and `edate`).

Query size limits for synchronous queries

If you are running a synchronous query (rawData)...

For time span < = 1 year

> State: 0 allowed
>
> County: 1 allowed
>
> Site: 1 allowed
>
> CBSA: 1 allowed
>
> CSA: 1 allowed
>
> Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 3.0 allowed

For 1 year < time span < = 5 years

> State: 0 allowed
>
> County: 1 allowed
>
> Site: 1 allowed
>
> CBSA: 1 allowed
>
> CSA: 1 allowed
>
> Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 0.5 allowed

For 5 years < time span < = 20 years

> State: 0 allowed
>
> County: 0 allowed
>
> Site: 1 allowed
>
> CBSA: 0 allowed
>
> CSA: 0 allowed
>
> Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 0.05 allowed

Query size limits for asynchronous queries

If you are running an asynchronous query (rawDataNotify)...

For time span < = 1 year

> State: 1 allowed
>
> County: 1 allowed
>
> Site: 1 allowed

CBSA: 1 allowed

CSA: 1 allowed

Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 50.0 allowed

For 1 year < time span < = 5 years

State: 0 allowed

County: 1 allowed

Site: 1 allowed

CBSA: 1 allowed

CSA: 1 allowed

Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 9.0 allowed

For 5 years < time span < = 20 years

State: 0 allowed

County: 1 allowed

Site: 1 allowed

CBSA: 0 allowed

CSA: 0 allowed

Bounding Box: (maxlat - minlat) + (maxlon - minlon) < = 0.5 allowed

Related information

- Section 1.5. Constructing a URL Request - Overview
- Section 1.6. Constructing a URL Request - Raw Data
- Section 2.1. You get an "HTTP 400 Bad Request / The webpage cannot be found" error in Internet Explorer

3.2. DMCSV Format

Contents of Data Mart Comma Separated Values (DMCSV) formatted files.

The primary advantages to using the DMCSV format are that it (1) includes full text descriptions rather than codes or abbreviations, (2) includes the Local and GMT time, and (3) includes the latitude and longitude with each sample (as does AQCSV).

Field Position	Field Name	Description
1	Latitude	The monitoring site's angular distance north of the equator measured in decimal degrees.
2	Longitude	The monitoring site's angular distance east of the prime meridian measured in decimal degrees.
3	Datum	The Datum associated with the Latitude and Longitude measures.
4	Horizontal Accuracy	The reported accuracy (in meters) of the Latitude and Longitude measures.
5	State Code	The FIPS code of the state in which the monitor resides.
6	County Code	The FIPS code of the county in which the monitor resides.

Field Position	Field Name	Description
7	Site Num.	A unique number within the county identifying the site.
8	Parameter Code	The AQS code corresponding to the parameter measured by the monitor.
9	POC	This is the "Parameter Occurrence Code" used to distinguish different instruments that measure the same parameter at the same site.
10	AQS Parameter Desc.	The name or description assigned in AQS to the parameter measured by the monitor. Parameters may be pollutants or non-pollutants.
11	Date Local	The calendar date of the sample in Local Standard Time at the monitor.
12	24 Hour Local	The time of day that sampling began on a 24-hour clock in Local Standard Time.
13	Date GMT	The calendar date in Greenwich Mean Time at the monitor for the sample.
14	24 Hour GMT	The time of day on a 24-hour clock in Greenwich Mean Time for the sample.
15	Year GMT	The calendar year of the sample in Greenwich Mean Time.
16	Day In Year GMT	The sequential day in the year of the sample in Greenwich Mean Time.
17	Sample Measurement	The measured sample value in the standard units of measure for the parameter.
18	Unit of Measure	The unit of measure for the parameter. QAD always returns data in the standard units for the parameter. Submitters are allowed to reporte data in any unit and EPA converts to a standard unit so that we may use the data in calculations.
19	Sample Duration	The length of time that air passes through the monitoring device before it is analyzed (measured). So, it represents an averaging period in the atmosphere (for example, a 24-hour sample duration draws ambient air over a collection filter for 24 straight hours). For continuous monitors, it can represent an averaging time of many samples (for example, a 1-hour value may be the average of four one-minute samples collected during each quarter of the hour).

Field Position	Field Name	Description
20	Sample Frequency	How often the monitor takes a sample. For hourly data (Duration = 1 hour), this field is null and means the frequency is continuous (that is, also 1 hour). Other typical values are daily, every third day, etc.
21	Detection Limit	The minimum sample concentration detectable for the monitor and method. NOTE: IF SAMPLES ARE REPORTED BELOW THIS LEVEL, THEY MAY BE REPLACED WITH ½ THIS LIMIT.
22	Measurement Uncertainty	The total uncertainty associated with a reported measurement as indicated by the reporting agency.
23	Qualifier Description	Sample values may have qualifiers that indicate why they are missing or that they are out of the ordinary. Types of qualifiers are: null data, exceptional event, natural events, and quality assurance.
24	Method Type	An indication of whether the method used to collect the data is a federal reference method (FRM), equivalent to a federal reference method, an approved regional method, or none of the above (non-federal reference method).
25	Method Description	A short description of the processes, equipment, and protocols used in gathering and measuring the sample.

3.3. AQCSV Format

Contents of Air Quality Comma Separated Values (AQCSV) formatted files. (This format was developed as the input and output format of the AIRNow International system.)

Note

This section makes many references to AQS codes. Many EPA systems transmit and store codes instead of long text descriptions to save space. To see the meanings of the codes, visit the AQS Code Description web page.

Field Position	Field Name	Description
1	site	Twelve-character field based on the three-digit ISO country code plus the nine-digit monitor location code. The nine-digit monitor location code is the AQS site identifier. It consists of a two-digit state code, a three-digit county code, and a four-digit site

Field Position	Field Name	Description
		number without spaces between the individual codes. For example, 123456789123 = 123 (country code) + 456789123 (nine-digit monitor location code).
2	data_status	Status of the data. 0 = Preliminary 1 = Final. Data are denoted as final after the agency collecting and reporting the data certifies that they meet quality assurance requirements and are complete and correct in AQS. This is only required for criteria pollutants reported from state agencies.
3	action_code	Action code for data ingesting. Not relevant to data obtained from QAD. Always blank.
4	datetime	Date and time of the data value, given in the following format without spaces: YYYYMMDDThhmmTZD. Four-digit year (YYYY), two-digit month (MM), two-digit day (DD), capital letter T (time), two-digit hour (hh, in 24-hr time), two-digit minutes (mm), and the time zone designation, TZD. (The date-time field is the ISO 8601 Basic.) TZD is +hhmm/-hhmm from GMT. The time corresponds to the begin time of the sampling period.
5	parameter	Five-digit AQS code used to identify the parameter being monitored.
6	duration	Measurement (sampling) period in minutes.
7	frequency	How often the measurement is repeated (minutes). If measurements are taken multiple times per day (i.e., hourly), it is blank; otherwise, minutes equivalent (e.g., every day = 1440, and every other day = 2880).
8	value	Data (sampled) value of the specified parameter.
9	unit	Three-digit AQS code used to describe the units in the measurement of the specified parameter.
10	qc	The AIRNow code used to link to the quality control codes that describe the validity, invalidity,

Field Position	Field Name	Description
		or questionable status of the measurement.
11	poc	The "parameter occurrence code" (POC). The POC is used to specify if more than one monitor is measuring the same parameter at the same site. For example, if there are two ozone monitors at a site, they would have different POCs.
12	lat	Latitude in decimal degrees of the monitor. Latitudes north of the Equator are positive and latitudes south of the Equator are negative.
13	lon	Longitude in decimal degrees of the monitor. Longitudes west of the Prime Meridian are negative and longitudes east of the Prime Meridian are positive.
14	GISDatum	The datum associated with the latitude and longitude measurements.
15	elev	Elevation of the monitor in meters above mean sea level (MSL).
16	method_code	Three-digit AQS code that identifies the method used to perform the measurement.
17	mpc	Measurement Performance Characteristic (MPC) is a performance measurement for the measurement taken. The only valid value for QAD responses is "MDL" meaning method (lower) detection limit.
18	mpc_value	The value for the mpc (MDL) in the same units as the sample.
19	uncertainty	Uncertainty needs to be in the same units as the specified parameter and is given using the 95% confidence level.
20	qualifiers	AQS qualifier code(s) separated by spaces. Qualifiers indicate whether the data have been flagged by the submitter and the reason the sample was so flagged.

3.4. AQS Format

Contents of Air Quality System pipe ("|") delimited format files. (This format was developed as the input and output format of the AQS system.)

Note

This section makes many references to AQS codes. Many EPA systems transmit and store codes instead of long text descriptions to save space. To see the meanings of the codes, visit the AQS Code Description web page.

Unlike the other formats, files in this format have their fields separated by the pipe ("|") character. The only reason it is provided to users is that many historical AQS data sets are available in this format and users have written code to ingest it. We provide it to prevent those users from having to adjust their own work.

Field Position	Field Name	Description
1	Transaction Type	Two-character identifier of the contents of the remainder of the fields in the row. For QAD, the currently allowed value is "RD" for Raw Data.
2	Action Code	Action code for data ingesting. Not relevant to data obtained from QAD. Always "I" (insert).
3	State Code	The FIPS code of the state in which the monitor resides.
4	County Code	The FIPS code of the county in which the monitor resides.
5	Site ID	A unique number within the county identifying the site.
6	Parameter	The AQS code corresponding to the parameter measured by the monitor.
7	POC	This is the "Parameter Occurrence Code" used to distinguish different instruments that measure the same parameter at the same site.
8	Sample Duration	A code representing the length of time that air passes through the monitoring device before it is analyzed (measured). So, it represents an averaging period in the atmosphere (for example, a 24-hour sample duration draws ambient air over a collection filter for 24 straight hours). For continuous monitors, it can represent an averaging time of many samples (for example, a 1-hour value may be the average of four one-minute samples collected during each quarter of the hour).
9	Unit	Three-digit AQS code representing the units of measurement of the specified parameter.
10	Method	Three-digit AQS code that identifies the method used to perform the measurement.
11	Date	The calendar date of the sample in Local Standard Time at the monitor.

Field Position	Field Name	Description
12	Start Time	The time of day that sampling began on a 24-hour clock in Local Standard Time.
13	Sample Value	The measured sample value in the standard units of measure for the parameter.
14	Null Data Code	If no sample value is available, a code indicating the reason.
15	Sampling Frequency	A code representing how often the monitor takes a sample. For hourly data (Duration = 1 hour), this field is null and means the frequency is continuous (that is, also 1 hour).
16	Monitor Protocol (MP) ID	A code representing the protocol (duration, unit, method and method detection limit) of the sample. Not relevant to data obtained from QAD. Always empty.
17 - 26	Qualifier 1 - 10	Codes representing any qualifiers on the data. Sample values may have up to 10 qualifiers that indicate why they are out of the ordinary. Types of qualifiers are: exceptional event, natural events, and quality assurance.
27	Alternate Method Detectable Limit	The minimum sample concentration detectable for the monitor and method. NOTE: IF SAMPLES ARE REPORTED BELOW THIS LEVEL, THEY MAY BE REPLACED WITH ½ THIS LIMIT. (Note, for QAD, this may be the alternate or federal limit, whichever is relevant to the sample.)
28	Uncertainty	The total uncertainty associated with a reported measurement as indicated by the reporting agency.

3.5. Future Plans

Upgrades under consideration for the Data Mart and the QAD interface.

Adding the following types of queries:

- Daily summary
- Annual summary
- 3-year summary (design values)

Adding the following additional output formats:

- NetCDF
- AQS AMP 501 (pipe delimited)

Any additional suggestions you have may be forwarded to `aqsdatamart@epa.gov`

3.6. Glossary

Definitions of terms for users of EPA Air Quality data.

HAP

> Hazardous air pollutant. A pollutant defined by statute to cause cancer if exposed to over long periods of time. Also called 'toxic' pollutant.

Monitor

> Within QAD and related data systems, the term "monitor" does not indicate a physical instrument. Rather, any time a parameter is measured at a site, a 'monitor' is created for that parameter. For example, if a sampler collects air that is analyzed in a gas chromatograph for 12 different parameters, then it is listed as 12 separate monitors in QAD. So the term monitor denotes that a time series of measurements for a parameter is available at a site. A monitor is indicated by the code or name of the parameter measured. If the parameter is measured more than once at a site, it is differentiated by the POC (parameter occurrence code).

Parameter

> The term for anything measured. EPA does not call everything in our Air Quality database a pollutant, because not everything we have has been defined by regulation or statute to be a pollutant. We do not call them substances because many of the measurements are not, for example temperature. Instead, the preferred term is "parameter". Each separate parameter represents measurements that can be compared to one another. Some substances give different results depending on the method used to sample them (most notably particulate matter) and will be represented as different parameters depending on the sampling method.

Raw Data

> Raw data is data that is reported to the EPA. Other terms are "measurement data" or "sample data". It may have been reduced (e.g., calculating an hourly average from many sub-hourly measurements) by the reporting agency before it was reported to EPA. However, it is the finest grain data that EPA has. For gaseous and some particulate parameters, we generally have hourly raw data. For other particulate data, including speciation parameters, and most of the hazardous/toxic air pollutants we generally have daily raw data.

> EPA will summarize/reduce the raw data into longer term averages and calculate statistics at the daily and annual level (e.g., means, maxes). We also calculate averages for NAAQS (national ambient air quality standard) durations, like 8-hour or 24-hour for some parameters. The NAAQS durations are available via the raw data services, but the longer term averages (daily or longer) are not.

Site

> A site is a geographic location where one or more monitors operate. Some call these monitoring stations or facilities. Sites are identified in QAD and related systems by the concatenation (with hyphens) of the State FIPS Code, the County FIPS Code, and a unique site number within the county. For reporting purposes, we allow tribal agencies to label the sites with just a Tribal ID (from the BIA) and the site number.

Toxic

> A pollutant defined by statute to cause cancer if exposed to over long periods of time. Also called 'hazardous air pollutant' (HAP).

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